






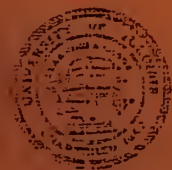
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Work Incentives and the Two-Earner Deduction

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Work Incentives and the Two-Earner Deduction

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## Abstract

One consequence of the two-earner deduction is to lower the marginal tax rate on the first dollar earned by secondary workers and to encourage their labor force participation. This study estimates the potential impact of the two-earner deduction on the probability of labor force participation by married women and tests the sensitivity of labor force participation levels to changes in the rate of deduction. Probit estimates of a labor force probability model suggest that the two-earner deduction increases the probability that a married woman work outside the home and that the effect is stronger the higher the deduction rate and the greater the after-tax income of the husband. Data for the study were drawn from the 1979 Michigan Survey of Income Dynamics.



## WORK INCENTIVES AND THE TWO-EARNER DEDUCTION

Beginning in 1983, two-earner families will be able to claim a deduction equal to ten percent of the earnings of the lesser earning spouse, up to a maximum deduction of \$3,000. One consequence of the deduction is to reduce the so-called marriage penalty on families with two earners. Another consequence is to lower the marginal tax rate on the first dollar earned by the lesser earning spouse, thus encouraging work outside the home. The purpose of this paper is to estimate the potential impact of the two-earner deduction on labor force participation and to test the sensitivity of labor force participation to a change in the rate of deduction.

The marriage penalty is the additional tax two-earner married couples pay compared to what they would pay if they were single. It originates in changes in the 1969 tax law which lowered the tax rate on single persons so that the tax liability of the single taxpayer could not exceed 120 percent of the liability of a married couple of similar economic standing. Since married couples were not given the privilege of filing as single persons if they so chose, married couples with two earners often found their tax liabilities higher than they would have been had it been possible for them to file as singles. This difference in tax liability, known as the marriage penalty or marriage tax, reached as high as \$4,800 in the highest tax bracket in 1981.<sup>1</sup>

As long as the budget set is convex, the decision whether or not to enter the labor force depends on the net wage in the first tax bracket.<sup>2</sup> If the net wage exceeds the reservation or shadow wage, it is optimal for a person to work outside the home; otherwise, the person will choose not

to participate in the labor market. Hence, the reservation wage reflects the monetary value of time in the home when all time is spent in the home. The two-earner deduction, by raising the net wage in the first bracket, encourages labor force participation by the lesser earning spouse.

In this study, we assume that the lesser earning spouse is always the wife. Although not true in all families, this is generally the case. Further, we assume that the wife is the secondary worker in the family. She bases her labor force decision on her husband's labor market decision, and while she is influenced by his decision, he is not influenced by hers. This is a common assumption in labor supply research and allows us to treat the earned income of the husband as an exogenous variable.

The first econometric study of the labor force participation of married women was by Mincer (1962). Using aggregate data on labor force participation across SMSA's Mincer sought to explain women's labor force participation through economic variables. His work called attention to the family nature of labor supply decisions. One shortcoming of the Mincer study was that he had to assume that the labor force participation rate for a region could be considered a good estimate of the average percentage of the life-cycle spent in the labor force by the married women of that region.

More recent studies have avoided this assumption by the use of cross-section data over households and individuals.<sup>3</sup> In these studies, labor force participation becomes a dichotomous variable equal to one if the individual is in the labor force and zero otherwise. Because of the statistical difficulty of using regression analysis with a dichotomous dependent variable, most of these studies have employed

probit analysis which yields consistent and asymptotically efficient parameter estimates in this case.

The present study employs the probit technique to estimate a probability model of labor force participation for married women. Data for the estimation are drawn from the Michigan Survey of Income Dynamics for 1979 and include observations on 1,465 women. The estimated probability model is used to calculate the probability of participation under the current tax law and under alternative forms of the two-earner deduction. The theoretical model is detailed in the next section.

#### I. Theoretical Expectations

The effect of an income tax on labor force participation can be analyzed within the standard labor-leisure framework. In our model we assume that satisfaction is derived from consumption of disposable income and leisure, where the utility function is of the Cobb-Douglas form:

$$U = \beta \log Y^d + (1 - \beta) \log L$$

and where  $Y^d$  is disposable income,  $L$  is hours of leisure, and  $\beta$  is a positive constant between zero and one. Disposable income or income after tax is the difference between pretax income,  $Y$ , and the tax liability,  $T(Y)$ , where pretax income is the sum of earned income and unearned income:

$$Y = w(K - L) + V$$

with  $w$  the hourly rate of pay,  $K$  the time endowment, and  $V$  unearned income. Unearned income might consist of the property income of the family and the wage income of other family members.



Assuming a progressive income tax, the tax function:

$$T = T(w(K - L) + V)$$

has a positive first derivative,  $T'$ , known as the marginal tax rate.

Substituting into the utility function and optimizing over leisure gives the following first order condition for utility maximization:

$$-\frac{\beta W}{w(K - L) + V - T} + \frac{(1 - \beta)}{L} \leq 0$$

with equality holding when there is an interior solution. Setting hours of leisure equal to the time endowment (i.e.,  $L=K$ ) and solving for the wage rate yields an expression for the reservation wage,  $w_R$ :

$$(1) \quad w_R = \frac{(1 - \beta)(V - \hat{T})}{\beta K(1 - \hat{T}')}$$

where the hats over the tax variables indicate that they are evaluated at  $L=K$ . Hence,  $\hat{T} = T(V)$  and  $\hat{T}' = T'(V)$  are the tax and marginal tax rate on unearned income or, alternatively, on the first dollar of wage income assuming a smooth tax function.

A person will participate in the labor force if the market wage is greater than or equal to the reservation wage and will not participate otherwise. Thus,

$$LFP = 1 \quad \text{if } w \geq w_R$$

and

$$LFP = 0 \quad \text{if } w < w_R$$

where LFP is a variable representing labor force participation. The effect of taxes is felt through their impact of  $w_R$ ; a tax change that increases  $w_R$  reduces the probability of labor force participation and vice versa for a change that reduces  $w_R$ .

The effect of a tax change on the reservation wage and labor force participation can be inferred by differentiating (1) with respect to  $\hat{T}'$  and  $\hat{T}$ . This yields:

$$\frac{\partial w_R}{\partial \hat{T}'} = \frac{(1 - \beta)(V - \hat{T})}{\beta K(1 - \hat{T}')^2}$$

which is positive, and

$$\frac{\partial w_R}{\partial \hat{T}} = - \frac{(1 - \beta)}{\beta K(1 - \hat{T}')$$

which is negative. Since labor force participation is inversely related to the reservation wage, our model suggests that an increase in  $\hat{T}'$  reduces the probability of labor force participation while an increase in  $\hat{T}$  increases the probability. An empirical test of this hypothesis is suggested in the next section.

## II. Empirical Model and Results

The theoretical model of the previous section states that labor force participation occurs if the market wage is greater than or equal to the reservation wage. Since the market wage is unobserved for those who do not work in the market and may be observed with error for those who do, we specify the following market wage equation that is assumed to hold for all women:

$$(2) \quad w = a_0 + a_1E + a_2A + a_3X + a_4X^2 + a_5C + \epsilon$$

where E is the education level of the individual, A is age, X is work experience, C represents children, and  $\epsilon$  is a normally distributed disturbance term with constant variance,  $\sigma^2$ .

Using equation (1) and (2), the participation condition may be rewritten as

$$a_0 + a_1E + a_2A + a_3X + a_4X^2 + a_5C + \epsilon \geq \frac{(1 - \beta)(V - \hat{T})}{\beta K(1 - \hat{T}')}$$

and the probability of participating may be written as:

$$\text{Prob (LEP)} = Z\left(\frac{a_0}{\sigma} - \frac{(1 - \beta)(V - \hat{T})}{\beta K\sigma(1 - \hat{T}')} + \frac{a_1}{\sigma}E + \frac{a_2}{\sigma}A + \frac{a_3}{\sigma}X + \frac{a_4}{\sigma}X^2 + \frac{a_5}{\sigma}C\right)$$

where Z is the unit normal cumulative distribution function.

Probit analysis was used to estimate the parameters of this function for a sample of married women. The sample for this study was drawn from the Michigan Survey of Income Dynamics for 1979. A total of 1,465 white, married women were selected for inclusion in the sample. Excluded from the sample were non-taxpaying households, households on welfare, and households whose head was over 60 years or less than 18 years, unemployed or receiving negative taxable income.

The dependent variable, labor force participation, was set equal to one if the wife's annual hours of work were greater than 100 and equal to zero otherwise. The unearned income of the family, V, was computed by subtracting the wife's earned income from total family income. The residual would then include the family's property income plus the earned income of other family members. The tax parameters,  $\hat{T}$  and  $\hat{T}'$ , were imputed on the basis of an estimated tax function. The family's total income tax liability was regressed on total family taxable income, number

of dependents, and whether or not the family owns a house. A similar regression was run for the family's marginal tax rate. The coefficients of these equations, shown in Table 1, were then used to calculate  $\hat{T}$  and  $\hat{T}'$  for each family by setting the wife's earnings equal to zero and, hence, taxable income equal to V.

The other explanatory variables included education, age, experience, experience squared, and a children variable. Education of the wife was measured in years as was age. Experience was measured as the number of years the wife worked since age 18 and experience squared was the same variable squared. The children variable reflected the number of children in the age groups 1-2 years, 3-5 years, 6-13 years, and 14-17 years.

The results of the probit estimation appear in Table 2. The coefficient of the tax variable,  $(V - \hat{T})/(1 - \hat{T}')$ , carries the expected negative sign. This implies that an increase in the tax on unearned income or a decrease in the marginal tax rate on unearned income will increase the probability of labor force participation of married women, confirming our earlier hypothesis. The implication of this finding for tax policy is discussed in the next section.

But first consider some of the other results of the estimation. The productivity variables, education and experience, both are related in the expected way to the probability of labor force participation. More educated women and those with more experience are seen to have a higher probability of labor force participation although the effect of experience decreases with increasing experience. The results also indicate that, holding other factors constant, older married women are less likely to participate in the labor force than are younger married women. This could either be a productivity effect or a preference effect.

Table 1 The Tax Functions (t-ratios in parentheses)

Variable	Federal Income Tax Liability	Marginal Tax Rate
Constant	-2594.6 (-9.912)	11.390 (20.666)
Taxable income	.315 (32.685)	.873x10 <sup>-3</sup> (43.023)
Number of Dependents	-429.0 (-7.310)	-.656 (-5.311)
Home ownership	-1281.3 (-6.114)	.912 (2.066)
Income squared	.190x10 <sup>-6</sup> (8.077)	---
Dependents x income	.010 (5.659)	---
Home ownership x income	.038 (4.525)	---
R <sup>2</sup>	.961	.890



Table 2 Probit Estimation of the Labor Force Participation Function for Married Women

Variable	Coefficient	t-ratio
Constant	1.265	4.29
$(V - \hat{T}) / (1 - \hat{T}')$	$-.476 \times 10^{-5}$	-3.72
Education	.078	4.13
Age	-.061	-11.82
Experience	.143	8.41
Experience squared	-.002	-3.80
Children 1-2 yrs.	-.712	-8.68
Children 3-5 yrs.	-.538	-7.08
Children 6-13 yrs.	-.093	-2.09
Children 14-17 yrs.	.040	0.58
Number of observations		1465
Minus two times log-likelihood ratio		$.359 \times 10^3$
Critical chi-squared ( $\alpha = .05$ )		16.919

The presence of young children in the home also lowers the probability of labor force participation as is seen clearly in Table 2. This could arise because children, especially those in the lower age groups, reduce the mother's productivity in the market or because women who chose to have children have a preference for non-market over market work. The results of the probit estimation suggest that the influence of children on the probability of labor force participation declines monotonically with the ages of the children, with the mothers of teenage children being somewhat more likely to work although the result is not significant.

The log-likelihood ratio presented at the bottom of the table provides a test of the significance of the explanatory variables as a group. Since minus two times the log-likelihood ratio is greater than the critical Chi-squared, we can conclude that the set of explanatory variables has predictive power in explaining the labor force participation of married women.

Next we turn to the implications of the results for tax policy.

### III. Tax Implications

In order to test the sensitivity of labor force participation to a change in the rate of the two-earner deduction, the probability of participation was calculated for each woman in the sample using the results of the probit estimation. First, the probability of participating under the current law was calculated. Its distribution by the husband's after-tax income class is shown in the first column of Table 3. As can be seen, the probability of labor force participation declines sharply with increases in the husband's after-tax income. While the probability

Table 3    The Probability of Labor Force Participation of Married Women  
Under Alternative Two-Earner Deductions, by Income Class

Husband's after- tax income	Current Law	10% De- duction	20% De- duction	50% De- duction
Under \$10,000	.701	.702	.702	.705
\$10,000 to \$14,999	.618	.620	.621	.627
\$15,000 to \$19,999	.590	.594	.597	.606
\$20,000 to \$24,999	.445	.451	.457	.473
\$25,000 and above	.168	.201	.226	.281
All	.537	.544	.550	.564

of participating in the labor force for a woman whose husband's income is less than \$10,000 is over .70, the corresponding participation probability for a woman whose husband's income is over \$25,000 is less than .17. For women in this sample, the average probability of labor force participation was calculated to be .54.

Next, the probability of labor force participation was calculated assuming two-earner deductions of 10%, 20%, and 50%. The effect of the two-earner deduction is to reduce the first-bracket tax rate facing married women thereby increasing the probability of their labor force participation. As shown in Table 3, the increases are greater the higher the rate of the two-earner deduction. On the average, a 10% deduction increases the probability of labor force participation by an estimated 1.3%, a 20% deduction increases it by an estimated 2.4%, while a 50% deduction increases labor force participation by an estimated 5%.

While these increases are small on the average, the simulation shows large expected increases in the probability of labor force participation for women with high income husbands. For the \$25,000 and over group, Table 3 shows that a 10% deduction can be expected to increase the probability of working outside the home by 19.6%, a 20% deduction will increase it by 34.5%, and a 50% deduction will increase it by 235.7%. This result is not unexpected since women with high income husbands face the highest marginal tax rates and have the lowest before-deduction probabilities of working. The two-earner deduction gives them the largest incentive to participate in the labor force.

#### IV. Conclusion

Our objective was to measure the impact of the two-earner deduction on the labor force participation of married women. We found that the two-earner deduction can be expected to increase the probability that a married woman participate in the labor force, and that the effect is stronger the higher the deduction rate and the the greater the after-tax income of the husband. Our purpose in this section is to suggest some directions for future research.

An underlying assumption of this study is that women are rational in their perception of the taxes they pay and that they correctly perceive the marginal tax rate they face. As a justification for our assumption, we rely on the results of a study by Rosen (1976) showing that married women perceive their taxes in the rational manner suggested by economic theory. This assumption could be tested within our model following Rosen's approach by introducing a perception coefficient into our model.

Another interesting extension of this study would be to recognize the importance of work-related costs to the labor force participation decision. As Hausman (1981) has shown, the fixed costs of working may create nonconvexities in the budget set which interact with the effect of taxes. The task of testing the significance of this effect is left to future research.

Finally, in doing our analysis, we assumed that the labor force behavior of the husband was exogenous to that of the wife. An interesting extension of this analysis would be to relax this assumption and treat the husband's and wife's labor force decisions within a simultaneous



model. Likewise, the decision to have children is probably dependent on one's labor force status as well as influencing the latter. This gets us into life-cycle considerations beyond the scope of this research.

Footnotes

<sup>1</sup>The marriage penalty is maximum for couples in the 50 percent tax bracket whose incomes are equally divided between the spouses.

<sup>2</sup>Hausman (1981) analyzes the implications of nonconvexities on the participation decision.

<sup>3</sup>See, for example, Leuthold (1978), Layard, Barton, and Zabalza (1980), or Hausman (1980).

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